

What is claimed is:

- 1 1. An optical transmission system, comprising:
2 an optical transmitting device;
3 an optical receiving device; and
4 an optical fiber transmission line placed between the
5 optical transmitting device and the optical receiving device,
6 wherein said optical transmitting device comprises:
7 an encoder for encoding a data signal with an
8 error-correcting code; and
9 an optical transmitter for converting the coded data
10 signal into a light signal based on error rate information
11 transmitted by the optical receiving device to provide an
12 output, and
13 said optical receiving device comprises:
14 an optical receiver for converting the received light
15 signal into an electrical signal; and
16 a decoder for error-correcting that electrical signal
17 to provide error rate information and a data signal.
- 1 2. The optical transmission system according to claim 1,
2 wherein said optical transmitting device comprises a
3 demodulator for demodulating the error rate information
4 transmitted by the optical receiving device, and
5 said optical receiving device comprises a modulator for
6 modulating the error rate information provided by the decoder.

1 3. The optical transmission system according to claim 1,
2 further comprising:
3 a line over which the error rate information is propagated
4 to the optical transmitting device.

1 4. The optical transmission system according to claim 1,
2 wherein said optical transmitting device comprises:
3 an optical coupler for branching an error rate
4 information light signal transmitted via the optical fiber
5 transmission line; and
6 an optical receiver for converting the branched light
7 signal into an electrical signal, and
8 said optical receiving device comprises:
9 an optical transmitter for converting the error rate
10 information into the light signal; and
11 an optical coupler for introducing the light signal onto
12 the optical fiber transmission line.

1 5. The optical transmission system according to claim 4,
2 wherein said optical fiber transmission line comprises:
3 an optical amplifier for amplifying a light signal
4 transmitted by the optical transmitting device;
5 an optical coupler placed at each of the input and output
6 of that optical amplifier; and
7 an optical fiber directly connecting these optical
8 couplers.

1 6. The optical transmission system according to claim 1,
2 wherein said optical transmitter comprises:
3 an electroabsorption modulator for modulating a laser
4 beam through electroabsorption optical modulation based on
5 the coded data signal;
6 drive control means for receiving the error rate
7 information and supplying that coded data signal and a DC
8 bias voltage to that electroabsorption modulator.

1 7. The optical transmission system according to claim 6,
2 wherein said drive control means comprises:
3 a drive amplifier for amplifying said coded data signal
4 and supplying that amplified data signal and the DC bias voltage
5 to the electroabsorption modulator; and
6 a controller for receiving the error rate information
7 and controlling the drive amplifier to minimize errors in
8 the optical receiving device.

1 8. An optical transmission system, comprising:
2 an optical transmitting device;
3 an optical receiving device; and
4 an optical fiber transmission line placed between the
5 optical transmitting device and the optical receiving device,
6 wherein said optical transmitting device comprises:
7 an encoder for encoding a data signal with an
8 error-correcting code;

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9 a demodulator for demodulating error rate information
10 transmitted by the optical receiving device; and
11 an optical transmitter for converting the coded data
12 signal into a light signal based on the error rate information
13 to provide an output,
14 said optical receiving device comprises:
15 an optical receiver for converting the received light
16 signal into an electrical signal;
17 a decoder for error-correcting that electrical signal
18 to provide error rate information and a data signal; and
19 a modulator for modulating the error rate information,
20 and
21 said system comprises a line over which the modulated
22 error rate information is transmitted from the optical
23 receiving device to the optical transmitting device.

1 9. An optical transmission system, comprising:
2 an optical transmitting device;
3 an optical receiving device; and
4 an optical fiber transmission line placed between the
5 optical transmitting device and the optical receiving device,
6 wherein said optical transmitting device comprises:
7 an encoder for encoding a data signal with an
8 error-correcting code;
9 a demodulator for demodulating error rate information
10 transmitted by the optical receiving device; and

11 an optical transmitter for converting the coded data
12 signal code into a light signal based on the error rate
13 information to provide an output,

14 said optical receiving device comprises:

15 an optical receiver for converting the received light
16 signal into an electrical signal;

17 a decoder for error-correcting that electrical signal
18 to provide error rate information and a data signal; and

19 a modulator for modulating the error rate information,

20 said system comprises a line over which the modulated
21 error rate information is transmitted from the optical
22 receiving device to the optical transmitting device, and

23 said optical transmitter comprises:

24 an electroabsorption modulator for modulating a laser
25 beam through electroabsorption optical modulation based on
26 the coded data signal; and

27 drive control means for receiving the error rate
28 information and supplying that coded data signal and a DC
29 bias voltage to that electroabsorption modulator.

1 10. An optical transmission system, comprising:

2 an optical transmitting device;

3 an optical receiving device; and

4 an optical fiber transmission line placed between the
5 optical transmitting device and the optical receiving device,

6 wherein said optical transmitting device comprises:

7 an encoder for encoding a data signal with an
8 error-correcting code;

9 an optical coupler for branching an error rate
10 information light signal transmitted by the optical receiving
11 device via the optical fiber transmission line;

12 a second optical receiver for converting the branched
13 code error rate information light signal into an electrical
14 signal;

15 a demodulator for demodulating that code error rate
16 information electrical signal; and

17 a first optical transmitter for converting the coded
18 data signal into a light signal based on the error rate
19 information to provide an output, and

20 said optical receiving device comprises:

21 a first optical receiver for converting the received
22 light signal into an electrical signal;

23 a decoder for error-correcting that electrical signal
24 to provide error rate information and a data signal;

25 a modulator for modulating the error rate information;

26 a second optical transmitter for converting the modulated
27 error rate information into a light signal; and

28 an optical coupler for introducing that light signal
29 onto the optical fiber transmission line.

1 11. An optical transmission system, comprising:

2 an optical transmitting device;

3 an optical receiving device; and

an optical fiber transmission line placed between the optical transmitting device and the optical receiving device,

wherein said optical transmitting device comprises:

an encoder for encoding a data signal with an error-correcting code;

an optical coupler for branching an error rate information light signal transmitted by the optical receiving device via the optical fiber transmission line;

a second optical receiver for converting the branched error rate information light signal into an electrical signal;

a demodulator for demodulating that error rate information electrical signal; and

a first optical transmitter for converting the coded data signal into a light signal based on the error rate information to provide an output,

said optical receiving device comprises:

a first optical receiver for converting the received light signal into an electrical signal;

a decoder for error-correcting that electrical signal
to provide error rate information and a data signal;

a modulator for modulating the error rate information;

a second optical transmitter for converting the modulated error rate information into a light signal; and

an optical coupler for introducing that light signal onto the optical fiber transmission line, and

said first optical transmitter comprises:

30 an electroabsorption modulator for modulating a laser
31 beam through electroabsorption optical modulation based on
32 the coded data signal; and
33 drive control means for receiving the error rate
34 information and supplying that coded data signal and a DC
35 bias voltage to that electroabsorption modulator.

1 12. An optical transmitting device for transmitting a light
2 signal to an optical receiving device via an optical fiber
3 transmission line, comprising:

4 an encoder for encoding a data signal with an
5 error-correcting code; and

6 an optical transmitter for converting the coded data
7 signal into a light signal based on error rate information
8 transmitted by the optical receiving device to provide an
9 output.

1 13. The optical transmitting device according to claim 12,
2 wherein said optical transmitter comprises:

3 an electroabsorption modulator for modulating a laser
4 beam through electroabsorption optical modulation based on
5 the coded data signal; and

6 drive control means for receiving the error rate
7 information and supplying said coded data signal and a DC
8 bias voltage to that electroabsorption modulator.

1 14. The optical transmitting device according to claim 13,

2 wherein said drive control means comprises:
3 a drive amplifier for amplifying said coded data signal
4 and supplying that amplified coded data signal and the DC
5 bias voltage to the electroabsorption modulator; and
6 a controller for receiving the error rate information
7 and controlling the drive amplifier to minimize errors in
8 the optical receiving device.

1 15. An optical transmitting device, comprising:
2 an encoder for encoding a data signal with an
3 error-correcting code;
4 an optical coupler for branching an error rate
5 information light signal transmitted by an optical receiving
6 device via an optical fiber transmission line;
7 an optical receiver for converting the branched error
8 rate information light signal into an electrical signal;
9 a demodulator for demodulating that electrical signal;
10 and
11 an optical transmitter for converting the coded data
12 signal into a light signal based on the demodulated error
13 rate information to provide an output.

1 16. The optical transmitting device according to claim 15,
2 wherein said optical transmitter comprises:
3 an electroabsorption modulator for modulating a laser
4 beam through electroabsorption optical modulation based on
5 the coded data signal; and

6 drive control means for receiving the error rate
7 information and supplying the coded data signal and a DC bias
8 voltage to that electroabsorption modulator.

1 17. The optical transmitting device according to claim 16,
2 wherein said drive control means comprises:

3 a drive amplifier for amplifying the coded data signal
4 and supplying that amplified coded data signal and the DC
5 bias voltage to the electroabsorption modulator; and

6 a controller for receiving the error rate information
7 and controlling the drive amplifier to minimize errors in
8 the optical receiving device.

1 18. An optical receiving device for receiving a light signal
2 from an optical transmitting device via an optical fiber
3 transmission line, comprising:

4 an optical receiver for converting the received light
5 signal into an electrical signal; and

6 a decoder for error-correcting that electrical signal
7 to provide error rate information and a data signal.

1 19. The optical receiving device according to claim 18,
2 further comprising a modulator for modulating the error rate
3 information provided by the decoder.

1 20. The optical receiving device according to claim 19,
2 further comprising:

3 an optical transmitter for converting the modulated
4 error rate information into a light signal; and
5 an optical coupler for introducing that light signal
6 onto the optical fiber transmission line.

1 21. An optical transmission system, comprising:

2 a plurality of optical transmitting devices for
3 transmitting light signals of different wavelengths;

4 a multiplexer for wavelength-multiplexing the plurality
5 of light signals;

6 an optical fiber transmission line over which the
7 wavelength-multiplexed light signal is propagated;

8 a demultiplexer for demultiplexing the
9 wavelength-multiplexed light; and

10 a plurality of optical receiving devices for receiving
11 light signals of the corresponding wavelengths,

12 wherein each of said optical transmitting devices
13 comprises:

14 an encoder for encoding a data signal with an
15 error-correcting code; and

16 an optical transmitter for converting the coded data
17 signal into a light signal based on error rate information
18 transmitted by the corresponding optical receiving device
19 to provide an output,

20 each of said optical receiving devices comprises:

21 an optical receiver for converting the received light
22 signal into an electrical signal; and

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5 that error rate information light signal is provided to the
6 optical receiver through the multiplexer.

1 25. The optical transmission system according to claim 21,
2 wherein said optical fiber transmission line comprises:
3 an optical amplifier for amplifying a
4 wavelength-multiplexed light signal;
5 an optical coupler placed at each of the input and output
6 of that optical amplifier; and
7 an optical fiber directly connecting these optical
8 couplers.

1 26. The optical transmission system according to claim 25,
2 wherein a dispersion compensator is connected to the
3 optical amplifier.

1 27. The optical transmission system according to claim 21,
2 wherein said optical transmitter comprises:
3 an electroabsorption modulator for modulating a laser
4 beam through electroabsorption optical modulation based on
5 the encoded data signal; and
6 drive control means for receiving the error rate
7 information and supplying the coded data signal and a DC bias
8 voltage to that electroabsorption modulator.

1 28. An optical transmission system, comprising:
2 two stations, and

3 a down optical fiber transmission line and an up optical
4 fiber transmission line placed between the two stations,

5 wherein each of said stations comprises:

6 an optical transmitting section comprising a plurality
7 of optical transmitting devices for transmitting light
8 signals of different wavelengths and a multiplexer for
9 wavelength-multiplexing the plurality of light signals; and

10 an optical receiving section comprising a demultiplexer
11 for demultiplexing the wavelength-multiplexed light and a
12 plurality of optical receiving devices for receiving light
13 signals of the corresponding wavelengths,

14 said optical transmitting device comprises:

15 an encoder for encoding a data signal with an
16 error-correcting code; and

17 an optical transmitter for converting the coded data
18 signal into a light signal based on error rate information
19 transmitted by the corresponding optical receiving device
20 to provide an output,

21 said optical receiving device comprises:

22 an optical receiver for converting the received light
23 signal into an electrical signal; and

24 a decoder for error-correcting that electrical signal
25 to provide error rate information and a data signal,

26 in the first station, each decoder of the optical
27 receiving section transmits error rate information to the
28 corresponding encoder of the optical transmitting section

29 and that error rate information is transmitted to the second
30 station, and

31 in the second station, each decoder of the optical
32 receiving section transmits the error rate information to
33 the optical transmitter of the optical transmitting section.

1 29. The optical transmission system according to claim 28,
2 wherein said second station comprises a multichannel
3 demodulator for error-correcting the error rate information
4 transmitted by the decoder to the optical transmitter.

1 30. The optical transmission system according to claim 28,
2 wherein said optical fiber transmission line comprises
3 an optical amplifier for amplifying the
4 wavelength-multiplexed light.

1 31. The optical transmission system according to claim 28,
2 wherein said optical transmitter comprises:
3 an electroabsorption modulator for modulating a laser
4 beam through electroabsorption optical modulation based on
5 the coded data signal; and

6 drive control means for receiving the error rate
7 information and supplying the coded data signal and a DC bias
8 voltage to that electroabsorption modulator.

1 32. An optical transmission method, comprising the steps
2 of:

3 encoding a data signal with an error-correcting code;
4 converting this signal into a light signal in an optical
5 transmitter with an electroabsorption modulator to provide
6 an output;

7 error-correcting the signal on the receiving side to
8 provide error rate information; and

9 controlling the electroabsorption modulator based on
10 the error rate information to reduce errors on the receiving
11 side.

1 33. The optical transmission method according to claim 32,
2 wherein a DC bias voltage supplied to the
3 electroabsorption modulator is controlled to control the
4 chirp coefficient.

1 34. The optical transmission method according to claim 32,
2 wherein the error rate information is sent back via the
3 optical fiber transmission line over which the data signal
4 is propagated.